very acute; they may be severe, but are usually quite acute in their course. Most of these cases would be practically well, or dead, before the stool examination would point to the cause of the disease. In chronic cases or in an epidemic the isolation of the bacillus would prove of great value.

It is a well known fact that the agglutination, or Widal test, is rarely demonstrable until after a number of days have elapsed. In many British war zone districts, where bacillary and amebic dysenteries are present, they give immediately emetin, in the hope that the acute symptoms will abate in the amebic cases. That test is valueless in the chronic cases because emetin has so little immediate effect on the vegetative form of ameba, and almost none on the encysted form.

I had one patient to whom I gave one gr. of emetin a day for seventeen days, and on the seventeenth day the stool contained vegetative form. One dose of salvarsan at that time apparently affected his cure.

There is no question that cases of amebic dysentery originate in California; for years I have seen cases which have developed here. I have one patient at present with amebiasis who has never been out of the state and another who in all probability contracted the disease here. The amebic form of dysentery will be found much more frequently if sought for. Many of these cases of colitis can be demonstrated to be amebic if the stools are properly examined; some cases of so-called mucous colitis may also be cleared up.

Certainly, in all suspicious cases where amebae are not present, the stools should be examined for bacillary dysentery, and we will probably avail ourselves in future of Dr. Meyer's offer to help us out.

Dr. Meyer (closing discussions): In emetin-resistance of endamoeba histolytica the use of salvarsan is to be highly recommended. In our experience in the tropics the improper use of emetin frequently produces drug resistant strains, and in numerous instances of this character salvarsan has proven exceedingly effective.

We had at the University Hospital a case of dysentery with remarkable emetin resistance of the amoeba. Two doses cured the clinical symptoms, but failed to destroy the cysts. So far, oil of chenopodium—thus far used against hookworm infections—is the only medicament known which promises relief to amoebic cyst-carriers. The investigations in the war zone will furnish us with information concerning the value of this and other drugs for the cure of these potential carriers.

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THE SANITARY SERVICE OF WAR AND THE DEMOBILIZATION PERIOD.*

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At a previous period consideration was given to the examination of the individual soldier in times of peace. How much of this system will be held to in time of war will depend greatly upon the character of the war we may be engaged in; also upon the kind of military system that may be in force at that time.

If the conflict should be one of limited object or extent, such as the pacification of Mexico, armies of only moderate size will be required. If men are drawn by lot as contemplated in some of the plans for universal military service recruiting officers will be able to pick and choose as they please. Substandard men will not need to be considered at all. If the quota from a certain district is found to be unfit it will be necessary merely to requisition others to fill their places.

If, however, even in a limited conflict our present volunteer system is retained it may be necessary to let down the bars to a considerable extent. This will be deplorable both from the standpoint of its bearing upon the efficiency of our armies in the field and on account of the great increase in cost to the government in caring for an unnecessarily large number of disabled soldiers during and after campaigns; and in disability pensions.

In the event of our being engaged in a conflict of unlimited extent such as is going on now in Europe we will be required to draw into our armies the last ounce of possibly useful human material. Many having physical defects that would bar their enlistment in times of peace will have to be taken and duties commensurate with their physical abilities found for them somewhere in the great military machine.

Places will be found for those possessing such defects as incipient tuberculosis, heart disease of mild degree and hernias, in some of the multifarious duties connected with the supply or keeping of accounts and records of great armies in the field.

As to the effect of war conditions upon the course and incidence of tuberculosis reports are confusing. One report says that among soldiers at the front most of the tubercular cases are benefited by the outdoor life led by the men. Another that under the fearful hardships of trench life many new cases develop and incipient cases become active and even florid.

There is a great deal of tuberculosis in the armies in Europe according to reports from British and French authorities and much study is being devoted to the problem. It is evident that

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much of it as it exists in the British army in France may be explained by lax methods of examination. Until conscription was enforced men were so badly needed that the medical examination was not very searching. Consequently many doubtful cases were let through.

The situation confronting the British authorities at this time was, presumably, identical with the one we will be forced to meet in our next great war. And we can profit very largely by their experience.

With regard to the relationship of tuberculosis to war Osler has recently made the following observations:

1. In the majority of cases the germ enlists with the soldier. A few, a very few, catch the disease in infected billets or barracks. What percentage of men is infected is unknown but it is rare not to find traces of tuberculosis in men of enlistment age who have died from other causes.

2. Of one million enlisted men of aforesaid age the proportion to acquire tuberculosis is much smaller than if these men had remained in civil life. It will be possible later to work out the exact incidence for comparison, with figures already available; but it seems established that the circumstances of a soldier's life do not, as a rule, weaken but strengthen resistance.

3. Exposure to hardships in the field, injury, drink, syphilis, may bring about favoring conditions for bacilli that already exist or which may gain access to the patient and the soldier reports sick with tuberculosis of lungs, glands, pleura, bones or brain.

From a summing up of evidence as presented by these two diverse viewpoints it would seem to be a safe inference that to enlist doubtful cases on the supposition that they will eventually become hardened involves too great a risk.

Heart disease as affected by field conditions is another problem that has received a great deal of attention from the British authorities. They have attempted to conserve for military uses a good part of those individuals with compensating heart lesions who would be cast into the discard at a time when the need for men was less urgent. After the routine examination all cases with cardiac defects are placed in a group to be further examined by specialists. The finer methods of cardiac diagnosis are brought into use, the electrocardiograph, particularly, having been found of value in making the final decision. By the aid of such exact methods it has been found possible to divide the candidates into five classes. (1) General service at home and abroad. (2) Field service at home. (3) Garrison service. (4) Labor service or sedentary work. (5) Unfit for any army service.

In a previous paper your attention was invited to the observation of certain phases of mental instability as related to the examination of applicants for enlistment. It may be of interest to you to consider for a moment some of the effects of war conditions upon the mind and nervous system of combatants.

The influences that are brought to bear upon the minds and nerves of soldiers during campaigns are of divers character. They are by no means all of a depressing or damaging nature. There is a certain mental buoyancy and nerve energy noticeable in an army in the field, which is pitched far above the average tone of most of the individual soldiers going to make it up. Proof of this is seen in the expressions of ready humor and bursts of rollicking song so constantly to be observed among troops in the field when there is action, actual or imminent.

The constant tension, excitement and traumatic effect of nearby high explosives tend to nerve exhaustion and injury so that the neuro-psychoses are common. This may occur in individuals without hereditary taint, in which case recovery is prompt. Those with a psychopathic taint often show no will to recover and often intensify their symptoms through a conscious or subconscious wish to be sent away from the battle zone.

While considering the mental and physical vagaries of the human material with which our wartime activities will be concerned a brief allusion to the subject of malingering may be of interest to you.

Many army surgeons of experience and with a conscientious desire to see that the government is not imposed upon, acquire a certain reputation among the enlisted men of the command. They are said to treat every man who reports at sick call as a "beat" until proven otherwise. This attitude goes far to discourage men from reporting for medical treatment unless actually in need of it and certainly has its advantages. Sick call must not be allowed to become a popular institution. Soldiers must be encouraged to carry their minor physical troubles lightly; to disregard them as much as possible. On the other hand, harsh methods here may dissuade actually sick men from reporting for treatment; individuals may suffer and, conceivably, epidemics gain headway before recognition. Here, as elsewhere, good judgment and accumulated experience point to a middle course.

It is a mistake to assume that because a soldier is detected in an obvious overstatement of his case that he is a malingerer. Allowance must be made for his limitations in powers of expression and his natural desire to secure a hearing for his case with sympathy and treatment.

When all these allowances have been made, however, there are still many who attempt to evade military duty by malingering. To many soldiers in active service, harassed almost beyond endurance, a short stay in hospital offers a moment's respite from requirements almost beyond their power. There are many other motives for malingering but in every case there is the desire, conscious or subconscious, to gain some particular end through pretense of disease or injury.

The soldier, then, matches his wits against those of the medical officer. With some of them doubts will be raised in our minds to a sufficient extent to make us feel justified in excusing him from

some of his duties or even taking him in hospital for a short period of observation. The latter expedient should be adopted only as a last resort, for once in the hospital it is often difficult to dislodge him. The experienced eye can often recognize the malingerer at first appearance, by his surly mien, his caution in answering questions, his lack of definiteness and constant appearance of being on guard.

In its application to special cases the subject of malingering is far too broad to consider in the short time at our disposal. It was desired merely to call to your attention, by a few generalizations, its importance to the medical officer.

The effect of war conditions on the venereal rate is interesting to note. When enemy territory is occupied there is a marked derangement, often a paralysis of industrial conditions. Thousands of women who formerly earned a living by honest toil are no longer able to do so. Thousands of others who formerly lived comfortably, supported by male relatives, are deprived of this support and have no way of supporting themselves. As a result the volitional class of prostitutes is heavily augmented from among those who can find no other way of keeping alive.

Consequently we may expect and do find a great increase in venereal disease under these conditions. Statistics gathered from the European war zones show that these diseases have increased 50% since the war began and that the increase applies equally to the civilian and the military population. The number of ineffectives resulting among the troops is very large with a corresponding loss in fighting efficiency.

All this is in spite of modern methods of prophylaxis which are known to be highly efficient when properly applied. The question then becomes one of proper administration of known methods. And we know that certain of the countries from which reports have been received are models of administrative efficiency.

It is evident that the difficulty lies in the impossibility of a complete regulation of the myriad phases of the lives of men and women; of an oversight of their actions sufficiently searching to enforce proper treatment and prophylaxis among all of them.

At some time we will be forced to meet the same problem and our attitude toward it must be one of active, hopeful work along well known lines, with eyes open to its difficulties; not counseling perfection nor being downcast at failure to attain it. A great deal can be done and will be done and the many cases of disease that we will have on our hands, in spite of all our efforts, will not blind us to the fact that we would have many more but for our methods of prophylaxis.

Of the communicable diseases met with under field conditions there are a few which ordinarily give us little concern in times of peace but which take on major importance in active service. Of these cholera, typhus, typhoid, and the paratyphoids most deserve mention.

Many reports on methods of dealing with these diseases have recently been published and the main facts are doubtless familiar to you all. Certain points concerning them are worthy of special emphasis, however. Typhoid fever, we have seen, has practically disappeared under thorough immunization with vaccine. In the paratyphoids we have two diseases which still cause a considerable total morbidity, among those who have received antityphoid vaccine.

Extensive tests have been made in Europe with a quadruple vaccine containing typhoid, the two paratyphoids and cholera. The results reported are highly encouraging and seem to solve the problem in a satisfactory manner.

The diagnosis of these diseases in the field is made scientifically by bacteriological methods. For laboratory work in the field equipment is supplied that can be packed in chests loaded into wagons and transported from place to place with facility. This equipment is sufficiently complete for routine microscopical and culture work in bacteriology and ordinary chemical and water analysis and gives satisfactory results in the hands of workers experienced in adapting themselves to field conditions.

The problem in typhus is simple in theory but somewhat complicated in application. It consists, as you know, in isolation of existing cases and preventing access of lice to them and a general delousing of the soldier, his equipment and habitation and the application of the same process to the civilian population.

Many methods of removing lice from the clothing have been tried; chemicals are efficient but expensive. For instance to kill lice on the clothing of 28,000 men infested with lice and gathered together in one camp it was estimated would require four tons of bichlorid of mercury. Steam and sulphur disinfection are quite effective but each has its drawbacks. Steam requires an expensive apparatus and a highly trained personnel. It also ruins leather. Sulphur damages material and does not kill the eggs. For the disinfection of the person and clothing finely powdered napthaline is most effective.

The ubiquity of typhus is perhaps not appreciated by all of us. According to Goldberger of the Public Health Service it exists in endemic form in New York, Philadelphia, Atlanta, Milwaukee, Chicago and Boston. It is a disease of poverty, misery, filth and overcrowding and is usually seen only in the poorest parts of these cities.

It naturally follows that epidemics of this disease in time of war would not pass us by and that compulsory louse disinfection would have to be reckoned with and must enter into any scheme of sanitary preparedness.

The importance assumed by trench warfare in modern military operations has given rise to a number of sanitary problems, some of which may be considered new, others a reappearance of old ones under new conditions. Among these are poisoning by noxious gases, burns by inflammable liquids and gases, frost bite, trench nephritis, septic infection with fecal, tetanic and gas-forming bacteria and

the results of long continued nerve strain already briefly discussed.

The so-called frost bite is rather a special condition resulting from cold, wet and tight-fitting foot and leg wear. More than 10,000 men in the British Army alone were incapacitated from this cause last winter. It is best prevented by properly fitted and adjusted shoes and leggings and the wearing of a bag of thin oiled silk between two socks.

Septic conditions are exceedingly common, due to the all pervading filth; gangrene, probably identical with the old hospital gangrene of our civil war, has been very common. At least ten organisms, different but closely allied, all anaerobic and spore bearing having been identified as concerned with this process. They are doubtless present in the soil of the trenches.

Tetanus claimed many victims early in the war. Prophylactic doses of antitetanic serum employed in all shell wounds and other cases where there is a probability of great contamination have caused its virtual disappearance. Lacerated wounds and highly manured soils are the essential factors in the production of this disease.

Trench nephritis, otherwise called war nephritis, is a rather nebulous condition. It has been observed frequently in individuals who have never been to the front or in the trenches, such as hospital attendants and men of the transport and supply departments. Some observers maintain that it is merely a nephritic tendency aggravated by the strain and hardships of active service. The weight of opinion, however, is that most of the cases observed are secondary to infection of one kind or another in which the foci of infection are in some part of the body usually remote from the kidneys. Minor infections, such as boils and abscesses, are believed to be the cause of many of them.

Among the duties of the Medical Department in the field, the securing of an uncontaminated water supply is of primary importance. Often the difficulties encountered seem overwhelming. It frequently happens that troops on the march can find nothing but stagnant pools to secure their drinking water from. Since we have known that our worst camp diseases are due to microorganisms that are in part waterborne, the necessity for some simple and efficient means of rendering contaminated waters potable has been evident.

This can, of course, be attained by the simple process of boiling, which has been tried and found impracticable. Organizations arriving in camp after a long, hot march find it impossible to restrain their men from quenching their often terrific thirst with whatever water is at hand. The time taken to build fires, boil and cool the water is considerable. And, moreover, the boiled and partially cooled water is unpalatable and most soldiers prefer to take a chance on live disease germs to drinking it.

Many devices have been tried in the last few years to find a solution to this problem. Most of them had the ability to furnish a certain quantity of pure water, but in trials under service conditions demonstrated defects that rendered them impracticable. Certain fundamental faults were common to all of them and it seemed almost impossible to eliminate them. These were in general the necessity of transporting in the field a weighty and bulky impedimentum, a limited output of water, and in some types the necessity of providing fuel of some kind.

To be of any value to an army in the field any device for the purification of water must be of such a character that it can, under all circumstances, be carried into the field and be as close to the soldier as his canteen. Of what use to have pure water for nine days of a march and on the tenth day to find himself unavoidably ahead of his transportation, which carries his cumbersome sterilizers, and forced to drink bad water.

The Medical Department of our army believes it has solved this problem with the so-called hypochlorite method. A canvas bag of specially woven flax, twenty inches in diameter and twenty-eight inches in length has been devised which gives sufficient capacity to supply a company of infantry at war strength with a canteen full of water for each officer and man. The opening of the bag is sewn over a galvanized iron ring, hinged at one diameter which permits the bag to be folded. It is supported from a pole by two pieces of hemp rope about three feet long. The bag is fitted with five self-closing faucets just above the bottom seam, spaced at equal intervals. This container weighs between seven and eight pounds and can be folded up into a convenient and readily portable package; and not too large or heavy to be carried by one soldier over his infantry pack.

The sterilization of the water is carried out by adding 15 gms. of calcium hypochlorite to a bagful of water, about forty-six gallons. Sufficient of the chemical can be carried in sixty glass tubes to supply an infantry company at war strength with five canteens of water per man, daily, for twelve days. Such a package of tubes weighs ten ounces, is about six inches long and three inches wide.

Cholera, typhoid and colon bacilli are killed by this process in about five minutes. For ameba ten to fifteen minutes is required.

Since many surface waters carry considerable quantities of suspended matter, a piece of Scotch flannel (outing) has been provided for the purpose of rendering the water clearer. This is effected by placing the outing flannel over the top and filtering the water through it when filling the bag.

The presence of a proper amount of hypochlorite at all times is insured by the frequent application of the simple starch-iodine tests during the process of sterilization.

With so much difficulty in securing a supply of pure drinking water for troops in the field the necessity of avoiding waste or a consumption of water in excess of the bare needs of the soldier is evident. This can only be attained with disciplined troops and experienced officers, who know the minimum amount of water intake necessary to sustain the body during a march of a certain dis-

tance. The medical officer may be appealed to for expert advice as to this question and unless forewarned and prepared may be at a loss to give accurate and concise information to commanding officers.

The question of water supply on the march resolves itself into two parts: How much water can the body afford to lose? When and how often must this water be replaced? A man weighing one hundred and fifty pounds contains in his tissues about one hundred pounds of water. He cannot lose more than one-tenth of this, ten pounds or one gallon, without running serious risk of death. If he is in good training he can perhaps at the outside afford to lose seven and five-tenths pounds or six pints without intolerable suffering and loss of efficiency. If in poor training a loss of two and five-tenths pounds or two pints will probably produce both of these.

How much water will he lose in a march over a given distance? In a march of one mile over ordinary roads in heavy marching order the actual exertion demanded is about ninety gram calories. If the heat thus produced is to be dissipated by evaporation then for every mile 180 c.c. of water must be got rid of. In one hour's march, say three miles, allowing for ten minutes' halt, he will have lost a 540 c.c. or almost one pint. For the first mile, however, the heat produced will be utilized in raising his body temperature to the optimum for exercise, in common parlance "getting warmed up." Heat regulation will not therefore come into play until this distance has been covered. At the end of the first four miles he will have lost one pint, at the end of the seven miles he will have lost two pints, the limit of permissible loss for the partially trained soldier. In his case then it will be seen that he should be able to march seven miles, half of an ordinary day's march, without drinking. At the half-way halt he must have his first drink and after that regularly every hour of the march one pint of water. His water bottle contains a little less than two pints, so that having marched seven miles without drinking he should have a little less than a pint at the half-way halt, and the rest at the end of ten miles, after which he should be able to get home without further supply.

Suppose, however, that the soldier is in the best possible physical condition and able to endure the maximum permissible loss, six pints, he can therefore cover six times three miles, in addition to the preliminary one mile, without drinking, a total of nineteen miles. So it is safe to say that every soldier should be in condition to cover an ordinary day's march of fourteen miles without resource to his water can, if the roads be ordinarily good.

If the march be prolonged, up to twenty-five miles say, every man must have his pint or thereabouts every hour after his limit of endurance has been reached, whatever his original permissible limit of loss might be. In well disciplined organizations these results are attained by never allowing men to drink except at the word of command.

When wars are over and the demobilization of troops takes place many important duties devolve upon the Medical Department. One of the most important of these is the supervision of troops returning from the war zone to insure against contagion being carried therefrom to the civil population at home.

Disabled soldiers must be cared for and in many cases reeducated to make themselves self-supporting in some form of industry.

Matters of interest and value for compiling the medical history of the war must be gathered together and individual records of sickness and injury gone over to adjudicate pension claims.

The title of this paper, as you will note, includes many activities of the Medical Department in war that are not touched upon this afternoon. Most of these omissions are of topics taken up by others in past or coming papers.

IS ACUTE ANTERIOR POLIOMYELITIS SPREAD BY DIRECT PERSONAL CONTACT?

REPORT OF AN INTERESTING INCIDENT.

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In accordance with the long-established policy of the California State Board of Health to investigate intensively cases of acute anterior poliomyelitis, an investigation of two cases occurring in children living in Mill Valley, Marin County, California, was recently carried out. The records of the cases with the important data collected, mainly from the viewpoint of contagiousness through contact, should prove of interest to all students of the epidemiology of the disease.

Case No. 1. Name, M. P., age 4½ years. Dr. O. P. Stowe, physician in charge.

The history of the case is as follows: On Monday, November 27, this child was ill. There was some nausea and vomiting followed by restlessness that night. On Tuesday, November 28, the child was considerably better. On the morning of Wednesday, November 29, there was a return of the nausea and vomiting. There was some diarrhea. Temperature was evident. With some improvement of the general condition the child was allowed to attend a dancing school party that same afternoon in Mill Valley. On November 30 the patient was first seen by Dr. Stowe, mainly because of restlessness the night before and temperature which had been present. Dr. Stowe informed me that the child was nauseated, with some vomiting during Thursday. All physical signs with special reference to paralysis were negative. When seen again on Friday, December 1, the vomiting had ceased but a paralysis was noted of one-half of the tongue; the tongue being directed somewhat to